Chapter Two: Aviation Demand Forecasts

1.0 General

The purpose of this chapter is to present a 20-year forecast of aviation activity at Concord Municipal Airport and to select the critical, design aircraft to be used throughout the forecast period. The forecasts serve as the basis for planning the facilities needed to meet the area's aviation demand. These forecasts will update and replace the projections presented in the *March 1996 Concord Municipal Airport Master Plan Update*.[i] The forecasts from the *2003 New Hampshire Aviation Airport System Plan*[ii], (NHAASP), are used as the basis, customized for Concord with data received from airport tenants and airport users. The NHAASP forecasts of aviation activity are from 2000 through 2010. Therefore, to provide a 20-year forecast for Concord Municipal Airport (2003 – 2023), extrapolation of the NHAASP data is provided where necessary. The aviation activity forecasts within this report provide the short (0 to 10 years), and long-term (11-20 years) ranges of activity.

The components of projected aviation demand will consist of both annual and peak season levels of activity.

The following are forecasted within this chapter, as they are key indicators of an airport's future development:

- Based Aircraft
- Aircraft Operations
- Critical Aircraft
- Fuel Flowage

1.1 Forecasts and Growth

Forecasts are estimates of future activity levels. The numbers projected for each of the categories above are not a policy statement as to the level of activity that should be at the airport. The projections are estimates of future activity based largely on past aviation trends in the area relating to the elements listed above and on other indicators such as population growth, income growth, etcetera, that historically track closely with aviation activity.

2.0 Based Aircraft Forecast

The NHAASP's method for determining the numbers of future based aircraft tests four methodologies: 1) applied socioeconomic growth rates (i.e. population growth rates); 2) Federal Aviation Administration (FAA) national growth rates; 3) population market share analysis; and 4) trend line analysis.[iii]

The results from the four projection methodologies for based aircraft were reviewed and the Population Market Share methodology was chosen as the preferred based aircraft projection for the State.

The Population Market Share forecast used historic and forecasted population data for the State and for each region within the State as the basis for the forecast. Using the population data (2000 is the base year) for each region and dividing that data by the number of based aircraft located within the region derived a population ratio. Applying that ratio to population forecasts within each region produced individual, or regional, based aircraft forecasts.

Table 2-1 outlines the projected based aircraft for Concord Municipal Airport as calculated in the NHAASP.

Table 2-1: Projected Based Aircraft – According to NHAASP

Year	Projected Based Aircraft for Concord Municipal Airport
2000 [1]	***81***
2005	***89***
2010	***99***

Source: *2003 New Hampshire Aviation Airport System Plan*[iv]
Note:
1. Actual data based on actual NHAASP site visits/inventory

The number of existing based aircraft presented in the *2003 New Hampshire Aviation Airport System Plan*, are slightly lower than the number (92) counted in the September 2004 inventory, approximately 3 percent higher than the NHAASP forecast for 2005.

To adjust for the slight increase in based aircraft as reported by airport tenants, 2004 data is used as the base year along with the NHAASP based aircraft forecasting method and extrapolation to adjust the projected based aircraft for 2008, 2013, and 2023 for Concord Municipal Airport as presented in **Table 2-2**.

Table 2-2: Adjusted Projected Based Aircraft - Concord Municipal Airport

Year	Adjusted Projected Based Aircraft
2004 [1]	***92***
2008	***100***
2013	***112***
2023	***137***

Note:
1. Actual data based on site visits/inventory data received from Concord Aviation Services[v]

2.1 Fleet Mix

Current information received from the records of Concord Aviation Services identifies the 2004 based aircraft fleet mix for Concord Municipal Airport as shown in **Table 2-3** along with the based aircraft fleet mix at both the State and national levels.

Table 2-3: Existing Based Aircraft Fleet Mix - State of New Hampshire/United States

Equipment Type	Concord Municipal Airport	Percent of Based	State of NH	Percent of Based	United States	Percent of Based
Single Engine (SE)	65	71	1,024	82	143,350	68
Multi-Engine (ME)	7	8	107	9	17,500	8
Turboprop (TP)	4	4	-	0	6,860	3
Turbo Jet (TJ)	1	1	33	3	8,500	4
Helicopter (HE)	2	2	19	1	6,650	3
Other: Ultralight (UL)	5	5	24	2	-	0
Other: Glider (GL)	0	0	13	1	-	0
Other: equipment type not specified	-	0	-	0	6,380	3
Experimental (EXP)	0	0	-	0	21,950	11
Military	8	9	20	2	-	0
Total Based Aircraft	***92***	***100***	***1,240***	***100***	***211,190***	***100***

Sources: Concord Aviation Services[v]
2003 New Hampshire Aviation Airport System Plan[vi]
FAA Aerospace Forecasts, Fiscal Years 2004-2015[vii]

Notes:
1. Dashed line indicates that data is not available for the equipment type listed
2. All data based on 2003/2004 based aircraft inventories (site visits/inventory data received from Concord Aviation Services)[v] with the exception of the data received from the State of New Hampshire, which is based on 2001 based aircraft inventories

As indicated in Table 2-3 above, the based aircraft fleet mix at Concord Municipal Airport closely correlates with the national based aircraft fleet mix reported by the FAA in *FAA Aerospace Forecasts, Fiscal Years 2004-2015.*[viii] The aircraft active fleet mix forecasted by the FAA in *FAA Aerospace Forecasts, Fiscal Years 2004-2015* indicates the following:

- Slow growth in general aviation in 2003 and 2004 with a return to normal growth patterns in 2005.
- The growth patterns for turbojet aircraft appear to be different than the growth patterns for piston, turboprop, rotorcraft and experimental aircraft.
- According to the FAA the single engine piston aircraft active fleet is projected to decrease in 2002 and 2003, maintain their levels in 2004, followed by a period of slow recovery in 2005, which represents an average annual growth rate of 0.3 percent throughout the forecast period (2004 – 2015).
- The FAA predicts the active multi-engine piston aircraft fleet will decline by 0.5 percent per year over the forecast period.
- The rotorcraft fleet is forecast to grow 0.6 percent annually followed by experimental aircraft at an annual growth rate of 0.4 percent.
- The turbine-powered fleet (turboprop and turbojet) is projected to increase at an average annual rate of 3.5 percent over the same time period.
- Turboprop aircraft are expected to increase at an average annual growth rate of 1.3 percent.
- Turbojet aircraft are expected to have the highest rate of increase at 4.9 percent annually.[ix]

The growth in the turbine-powered fleet (turboprop and turbojet) indicates that the general aviation fleet mix is moving toward more sophisticated, corporate aircraft, while single engine, multi-engine, rotorcraft, and experimental aircraft are projected to experience an average annual growth rate of less than 0.6 percent per year.

The future based aircraft fleet mix for Concord Municipal Airport is projected for 2008, 2013, and 2023 using the FAA forecasting methodology as presented in **Table 2-4**.

Table 2-4: Projected Based Aircraft Fleet Mix – Concord Municipal Airport

Year	2008		2013		2023	
Equipment Type	**Based Aircraft**	**Percent of Total**	**Based Aircraft**	**Percent of Total**	**Based Aircraft**	**Percent of Total**
Single Engine (SE)	71	71	80	71	99	72
Multi-Engine (ME)	7	7	8	7	9	7
Turboprop (TP)	4	4	4	4	6	5
Turbo Jet (TJ)	1	1	2	2	3	2
Helicopter (HE)	2	2	2	2	3	2
Other: Ultralight (UL)	5	5	6	5	7	5
Other: Glider (GL)	0	0	0	0	0	0
Other: equipment type not specified	0	0	0	0	0	0
Experimental (EXP)	0	0	0	0	0	0
Military	10	10	10	9	10	7
Total Based Aircraft	**100**	**100**	**112**	**100**	**137**	**100**

Source: *FAA Aerospace Forecasts, Fiscal Years 2004-2015*
Note:
The military anticipate increasing their fleet by two helicopters by the end of 2004

3.0 Aircraft Operations Forecast

The aircraft operations forecast presented in the following sections outlines annual and peak period aircraft activity at Concord Municipal Airport.

3.1 Annual Aircraft Operations Forecast

The NHAASP's method for projecting annual aircraft operations was based on testing three methodologies: 1) applied socioeconomic growth rates (i.e. population growth rates); 2) FAA operations-per-based-aircraft (OPBA); and 3) trend line analysis.[x]

The results from the three projection methodologies for annual aircraft operations were reviewed and the OPBA methodology was chosen as the preferred annual aircraft operations projection for the State.

The OPBA methodology divides the number of aircraft operations by the number of based aircraft to develop an average number of operations per based aircraft, which in turn is applied to the based aircraft forecast to obtain operations forecast.

Airport tenants estimated the total annual airport operations for 2003 at approximately 85,000,[v] which is 40 percent higher than the 61,677 annual operations forecast for 2010, identified in the *2003 New Hampshire Aviation Airport System Plan.* Due to the discrepancies, we looked at forecasting methods used at other general aviation airports similar to Concord Municipal.

Typically, collecting annual airport operations data at non-towered general aviation airports is difficult due to the lack of air traffic control. Characteristically, greater confidence can be placed in based aircraft data because based aircraft are more easily counted than annual airport operations. Discussions with aviation tenants and airport users and application of the OPBA methodology used in the *2003 New*

Hampshire Aviation Airport System Plan indicate that the existing total number of airport operations is closer to approximately 55,000 operations as indicated in **Table 2-5**.

Table 2-5: Annual Operations - Reported By Airport Tenants/Airport Users (September 2004)

Airport Tenant or Airport Users	Reported Number of Annual Operations [1]	Based Aircraft or Typical Aircraft Used [2]	
Based Aircraft – Airport Tenants (92 Based Aircraft)			
Concord Aviation Services Sub-Lease Tenants and Rental Aircraft: 70 total aircraft (33 total aircraft in hangars and 37 total aircraft on tie-downs)			
Concord Aviation Services Rental Fleet: 5 total rental fleet aircraft	3,115	5 SE 3 Cessna 172 1 Cessna 182 1 Beechcraft Bonanza	
Sub-Lease Hangar Tenants - Private Aircraft Owners: 24 total private aircraft owners leasing hangar space	14,952	17 SE Various	1 HE Various
		3 ME Various	2 UL Various
		1 TP Various	
Sub-Lease Hangar Tenants - Sunlight Corporation: 4 total aircraft leasing hangar space [4]	1,100 [3]	3 TP Fairchild Merlins	
	360 [3]	1 TJ Canadair Challenger	
Sublease Tie-down Tenants - Private Aircraft Owners: 37 total private aircraft owners leasing aircraft tie-downs	23,051	31 SE Various	2 UL Various
		3 ME Various	1 EXP Various
New Hampshire Army National Guard: 8 total aircraft/helicopters [5]	1,600 [3]	7 HE Black Hawks	
	400 [3]	1 TP C-12 or King Air	
New Hampshire State Police – Aviation Unit: 2 total aircraft leasing hangar space [6]	630 [3]	1 SE 1 Cessna 182	
	350 [3]	1 HE Bell 407	
C&M Management Corporation (T-Hangar Tenants): 12 total private aircraft owners leasing hangar space	7,476	11 SE Various	
		1 ME Various	
Total Estimated Based Aircraft Operations	**53,034**		

Table 2-5 Continued

Itinerant Aircraft – Non-Airport Tenants		
Concord Civil Air Patrol (CAP) [7]	1,300 [3]	6 SE 2 Cessna 172's 3 Cessna 182's 1 Maule
Aviation Related Companies that Typically Operate at Concord Municipal Airport (Data from Table 1-7, *Chapter 1 – Inventory*)	900 [3]	
Total Estimated Itinerant Aircraft Operations	**2,200** [3]	
Total Estimated Aircraft Operations	**55,234**	

Notes:
1. The annual number of operations for most of the based aircraft is based on the operations per based aircraft (OPBA) methodology reported in the *2003 New Hampshire State Airport System Plan Update*,[xi] which listed 50,430 annual operations in 2000 and 81 based aircraft for a total of 623 OPBA. The OPBA divides the number of aircraft operations by the number of based aircraft to develop an average amount of operations per based aircraft.
2. The listed based aircraft acronyms are as follows: Single-Engine Piston (SE), Multi-Engine Piston (ME), Turboprop (TP), Helicopter (HE), Turbo Jet (TJ), Ultralight (UL) and Experimental (EXP).
3. Annual operations data based on discussions with airport tenants/users not based on the OPBA method
4. The Fairchild Merlin is a twin turboprop aircraft. According to discussions with the owner, Sunlight Corporation owns and operates three Fairchild Merlin's on a daily basis. The Canadair Challenger is a corporate type jet aircraft. Although not based at the airport, it does operate to and from the airport on a daily basis with more frequency during the winter months.[xii]
5. Discussions with Army personnel[xiii] indicate that the Black Hawk Helicopters conduct approximately 30 operations per week, while the C-12 aircraft conducts approximately 8 operations per week. Army personnel indicated that the C-12 is used mainly for administrative transportation, while the helicopters are used for medical flights. They anticipate to increase the based helicopters by two in December of 2004 bringing the total to 9 Black Hawk helicopters based at the airport.
6. Data collected from discussions with New Hampshire State Police – Aviation Unit personnel[xiv]
7. Discussions with CAP personnel indicate that on average 25 operations are conducted weekly by the mix of aircraft listed.[xv]

The difference between the calculations in Table 2-5 and the projections in the operations forecast presented in the *2003 New Hampshire Aviation Airport System Plan* are not significant. Since it is best to use the upper levels of a range when forecasting to insure adequate space will be set aside, the NHAASP forecast method is used to estimate the existing and project annual airport operations for 2008, 2013, and 2023 for Concord Municipal Airport as presented in **Table 2-6**.

Table 2-6: Projected Aircraft Operations (Rounded to the Nearest 100)

Year	Based Aircraft Projections	Operations Per Based Aircraft	Annual Operations
2004*	92	623	**57,300**
2008	100	623	**62,300**
2013	112	623	**69,800**
2023	137	623	**85,400**

* Based on estimates of the airports baseline conditions as of September 2004 and the OPBA methodology

3.2 Peak Period (Peak Hour) Aircraft Operations Forecast

Peak hour operations are used to determine facility requirements such as ramp and terminal space requirements.

According to discussions with airport tenants,[v] the airport experiences the greatest amount of activity in the months of May through September, with peak activity taking place in the month of August. The following events contribute to increases in airport activity:

- Third week of July: National Association for Stock Car Auto Racing (NASCAR) races at the New Hampshire International Speedway
- Third week of September: NASCAR races at the New Hampshire International Speedway
- Week prior to Labor Day: Students return to area prep schools
- Week prior to Memorial Day: Students leave area prep schools
- Weeks/Weekends of Memorial Day (May), Independence Day (July), Labor Day (September), and Columbus Day (October)

Holidays such as Thanksgiving and Christmas also contribute to increased airport activity, as do special events such as the New Hampshire Presidential Primary (every four years).

The busiest hours of operation are between 7:00 AM and 10:00 AM and 3:00 PM and 6:00 PM.

Continuing the methodology presented in the *March 1996 Concord Municipal Airport Master Plan Update*,[xvi] projected peak hour operations are calculated below in **Table 2-7**.

The peak month is derived by assuming that the peak month is 20 percent busier than the average month and it is assumed that 20 percent of the daily operations would occur in the peak hour.

Table 2-7: Projected Peak Hour Aircraft Operations

Year	Annual Operations	Peak Month Operations (Rounded to the Nearest 100)	Peak Day Operations (Rounded to the Nearest 10)	Peak Hour Operations
2004*	**57,300**	(57,300/12) x 1.2 = 5,700	(5,700/30) = 190	(190 x 20%) = **38**
2008	**62,300**	(62,300/12) x 1.2 = 6,200	(6,200/30) = 210	(210 x 20%) = **42**
2013	**69,800**	(69,800/12) x 1.2 = 7,000	(7,000/30) = 230	(230 x 20%) = **46**
2023	**85,400**	(85,400/12) x 1.2 = 8,500	(8,500/30) = 280	(280 x 20%) = **56**

* Based on estimates of the airports baseline conditions as of September 2004

3.3 Other Aircraft Operations Forecast

3.3.1 Aircraft Operations Per Runway

The information provided in this section is used to determine typical runway use and to identify potential noise impacts at Concord Municipal Airport.

Aircraft operations per runway are presented in *Chapter 1 – Inventory* of this airport master plan update. Due to the availability of numerous navigational approaches at the airport, the unlikelihood of more sophisticated navigational aids, and the continued existence of the two useable runways; aircraft operations per runway would remain constant throughout the planning period as shown in **Table 2-8.**

Table 2-8: Projected Aircraft Operations Per Runway (Rounded to the Nearest 100)

Year	Runway	Runway 17	Runway 35	Runway 12	Runway 30
	Runway Use (percent)	75		25	
		25	50	10	15
	Projected Operations	Runway 17	Runway 35	Runway 12	Runway 30
2004*	**57,300**	14,300	28,700	5,700	8,600
2008	**62,300**	15,600	31,200	6,200	9,300
2013	**69,800**	17,500	34,900	7,000	10,500
2023	**85,400**	21,400	42,700	8,500	12,800

* Based on estimates of the airports baseline conditions as of September 2004

3.3.2 Local and Itinerant Aircraft Operations

The FAA defines local operations as operations performed by aircraft that:

1. Operate in the local traffic pattern or within sight of an airport;
2. Are known to be departing for or arriving from flight in local practice areas located within a 20-mile radius of the airport; or
3. Are executing simulated instrument approaches or low passes at an airport

Itinerant operations are considered to be all operations (general aviation, military, air carrier, or air taxi) other than those listed above. Local and itinerant operations for Concord Municipal Airport are estimated to be 40 and 60 percent, respectively, per discussions with FBO personnel.

It is assumed that these percentages will remain the same throughout the planning period. Projected annual and peak hour local and itinerant operations for Concord Municipal Airport are shown in **Table 2-9.**

Table 2-9: Projected Local and Itinerant Operations (Rounded to the Nearest 100)

Year	Total Annual Operations	Percent of Local Operations	Annual Local Operations	Peak Hour Local Operations	Percent of Itinerant Operations	Annual Itinerant Operations	Peak Hour Itinerant Operations
2004*	57,300	40	**22,900**	**15**	60	**34,400**	**23**
2008	62,300	40	**24,900**	**17**	60	**37,400**	**25**
2013	69,800	40	**27,900**	**18**	60	**41,900**	**28**
2023	85,400	40	**34,200**	**22**	60	**51,200**	**34**

* Based on estimates of the airports baseline conditions as of September 2004

3.3.3 Touch-and-Go Aircraft Operations

Of the local flights, approximately 30 percent are reported as touch-and-go operations and are expected to remain as such throughout the planning period. Airport personnel indicate, "Concord's geographic location, type of traffic, and available navigational aids make it a routine training facility for student pilots. Because of these factors, we see a higher than usual T&G [touch and go] component

[operations]. We estimate local operations at 25-30 percent T&G'.[xvii] **Table 2-10** shows the projected number of touch-and-go operations for Concord Municipal Airport.

Table 2-10: Projected Touch-and-Go Operations (Rounded to the Nearest 100)

Year	Annual Local Operations	Percent of Local Operations	Annual Touch-and-Go Operations
2004*	22,900	30	**6,900**
2008	24,900	30	**7,500**
2013	27,900	30	**8,400**
2023	34,200	30	**10,300**

* Based on estimates of the airports baseline conditions as of September 2004

3.3.4 Nighttime Versus Daytime Aircraft Operations

Airport personnel report that the activity occurring at night (10:00 PM to 7:00 AM) is approximately 20 percent of the annual number of operations and are expected to remain as such throughout the planning period. Projected annual and peak hour nighttime and daytime activity is outlined in **Table 2-11**.

Table 2-11: Projected Nighttime Versus Daytime Operations (Rounded to the Nearest 100)

Year	Total Annual Operations	Nighttime *(10:00 PM – 7:00 AM)*			Daytime *(7:00 AM – 10:00 PM)*		
		Percent of Nighttime Operations	Annual Nighttime Operations	Peak Hour Nighttime Operations	Percent of Daytime Operations	Annual Daytime Operations	Peak Hour Daytime Operations
2004*	57,300	20	**11,500**	**8**	80	**45,800**	**31**
2008	62,300	20	**12,500**	**8**	80	**49,900**	**33**
2013	69,800	20	**14,000**	**9**	80	**55,900**	**37**
2023	85,400	20	**17,100**	**10**	80	**68,300**	**46**

* Based on estimates of the airports baseline conditions as of September 2004

From discussions with airport personnel, it is reported that visual flight rule (VFR) flights account for approximately 60 percent of the total operations, while the remaining 40 percent are instrument flight rules (IFR) flights. It is assumed that instrumentation will not change so the relationship of IFR and VFR operations will remain constant throughout the study period. Projected annual and peak hour VFR and IFR activity is outlined in **Table 2-12.**

Table 2-12: Projected Operations (VFR versus IFR) – Rounded to the Nearest 100

Year	Total Annual Operations	VFR			IFR		
		Percent of VFR Operations	Annual VFR Operations	Peak Hour VFR Operations	Percent of IFR Operations	Annual IFR Operations	Peak Hour IFR Operations
2004*	57,300	60	**34,400**	**23**	40	**22,900**	**15**
2008	62,300	60	**37,400**	**25**	40	**24,900**	**17**
2013	69,800	60	**41,900**	**27**	40	**27,900**	**19**
2023	85,400	60	**51,200**	**33**	40	**34,200**	**23**

* Based on estimates of the airports baseline conditions as of September 2004

4.0 Critical Aircraft

Airports need to be maintained and developed according to the characteristics of the most demanding aircraft expected to use the airport on a regular basis. The aircraft with the most critical approach speed, wingspan and weight is the "critical aircraft" using the airport on a regular basis. The FAA defines a "regular basis" as at least 500 operations per year. The FAA, in Advisory Circular (AC) 150/5300-13 *Airport Design*, has established the Airport Reference Code (ARC) as the method of determining airport design criteria based on the critical aircraft.[xviii]

Aircraft Approach Category

Category A: Speed less than 91 knots
Category B: Speed 91 knots or more but less than 121 knots
Category C: Speed 121 knots or more but less than 141 knots
Category D: Speed 141 knots or more but less than 166 knots
Category E: Speed 166 knots or more

Airplane Design Group

Group I: Wingspan up to but not including 49 feet
Group II: 49 feet up to but not including 79 feet
Group III: 79 feet up to but not including 118 feet
Group IV: 118 feet up to but not including 171 feet
Group V: 171 feet up to but not including 214 feet
Group VI: 214 feet up to but not including 262 feet

The *March 1996 Concord Municipal Airport Master Plan Update* identified the overall design code for Concord Municipal Airport as B-II with the Gulfstream I as the critical aircraft.[xix] However, the NHAASP identified the overall design code for Concord Municipal Airport as C-II.[xx]

Discussions with airport tenants and airport users identified the typical aircraft using the airport. For the most part, Concord Municipal Airport serves primarily small turbo-prop aircraft, single and twin-engine piston aircraft, and the occasional business jet traffic, (jet traffic accounts for approximately 2 percent of the annual aircraft operations – approximately 900 of the 55,000 annual aircraft operations).[xxi] The larger turboprop and jet aircraft with the most critical approach speed, wingspan and weight are the "critical aircraft". The critical aircraft that typically operate at Concord Municipal Airport and their approach category and airplane design group (airport reference code) are depicted in **Table 2-13**.

Table 2-13: Typical Critical Aircraft Operating at Concord Municipal Airport

Aircraft Type	Airport Reference Code	Estimated Annual Operations as of September 2004
Cessna Aircraft (Citation Jet and Citation II); and Raytheon Aircraft (Beechcraft Beechjet 400)	B-I	430
Cessna Aircraft (Bravo, Encore, Excel, and III); Gulfstream Aircraft (Gulfstream I); Raytheon Aircraft (Hawker 800, 800XP, 1000, Beechcraft King Air, Beechcraft 1900); and Dassualt Aircraft (Falcon 50)	B-II	370
Cessna Aircraft (Citation VII and Citation X); Gulfstream Aircraft (Gulfstream III); Bombardier Aircraft (Challenger 300, 601 and 604); Dassault Aircraft (Falcon 2000); and Embraer Aircraft (Legacy)	C-II	32
Boeing Aircraft (727) and Saab (2000)	C-III	32
Bombardier Aircraft (Lear 31, 40, 45 and 60)	D-I	24
Gulfstream Aircraft (Gulfstream III and IV)	D-II	12

Sources: Discussions with airport tenants and users, *Aviation Week & Space Technology*[xxii], FAA's Advisory Circular AC 150/5300-13, *Airport Design*[xxiii], and *Aircraft Characteristics*[xxiv]

The data provided above indicates that existing critical aircraft operations (as of September 2004) occur with more aircraft that fall into the B-I/B-II airport design criteria (approximately 800 operations by B-I/B-II aircraft and approximately 100 operations by C-II, C-III, D-I and D-II aircraft). As indicated, aircraft with more stringent design standards (C-II, C-III, D-I and D-II criteria) currently utilize the airport; however, with less frequency than B-I/B-II aircraft. Discussions with airport tenants and users indicate that although there are some operations conducted by these larger aircraft (the majority are seasonal operations or operations during peak periods or special events), it is assumed that future critical aircraft would most likely remain in the B-I/B-II airport design criteria family.

In accordance with the data presented above regarding the frequency of activity by B-I/B-II aircraft, and in the interest of remaining consistent with past planning criteria, it would appear appropriate to designate the design code for Concord Municipal Airport as B-II. However, discussions with airport tenants, airport users and the FAA indicate that there is a need to analyze both B-II and C-II airport design criteria for Runway 17-35 only due to the potential increase in the use of larger aircraft at the airport in the future. Therefore, in an effort to avoid constraining potential airport growth and potentially underestimating the airports future needs, B-II versus C-II design criteria is further analyzed here and in subsequent chapters.

If the number of operations by C-II, C-III, D-I and D-II aircraft were to substantially increase, more stringent design standards in regards to runway width, runway safety areas, object free areas, and all other design criteria would be required to accommodate those larger aircraft. **Table 2-14** illustrates the design criteria for a B-II airport and the airport design criteria for the other classifications. The major differences in runway design standards between the existing B-II standards and the standards required for C-II, C-III, D-I and D-II aircraft are identified within the table in bold and italicized type.

Table 2-14: Design Criteria

Design Elements	Design Criteria (feet unless otherwise indicated)			
	B-II Existing and Future Design Criteria	C-I and D-I Design Criteria	C-II and D-II Design Criteria	C-III and D-III Design Criteria
Runway:	**Visibility not lower than ¾-mile**			
Width	75	***100***	***100***	***100***
Runway Shoulder Width:	10	10	10	***20***
Runway Blast Pad:				
Length	150	100	150	***200***
Width	95	***120***	***120***	***140***
Runway Safety Area:				
Length beyond runway end	300	***1,000***	***1,000***	***1,000***
Width	150	***400 and 500***	***400 and 500***	***500***
Runway Obstacle Free Zone:				
Length beyond runway end	200	200	200	200
Width	400	400	400	400
Runway Object Free Area:				
Length beyond runway end	300	***1,000***	***1,000***	***1,000***
Width	500	***800***	***800***	***800***
Taxiway/Taxilane:				
Width	35	25	35	***50***
Taxiway Edge Safety Margin	7.5	5	7.5	***10***
Taxiway Shoulder Width	10	10	10	***20***
Taxiway Safety Area Width	79	49	79	***118***
Taxiway Object Free Area Width	131	89	131	***186***
Taxilane Object Free Area Width	115	79	115	***162***
Runway Separation Standards:	**Visual runways and runways with not lower than ¾-statute mile approach visibility minimums**			
Runway centerline to taxiway/taxilane centerline	240	***300***	***300***	***400***
Runway centerline to aircraft parking area	250	***400***	***400***	***500***
Taxiway/Taxilane Separation Standards:				
Taxiway centerline to parallel taxiway/taxilane centerline	105	69	105	***152***
Taxiway centerline to a fixed or moveable object	65.5	44.5	65.5	***93***
Taxilane centerline to parallel taxilane centerline	97	64	97	***140***
Taxilane centerline to a fixed or moveable object	57.5	39.5	57.5	***81***

Source: Advisory Circular 150/5300-13, *Airport Design*[xxv]

Note:

1. According to Advisory Circular 150/5300-13, *Airport Design*, for ARC C-I and C-II, a runway safety area of 400 feet is permissible

If the airport were to remain as a B-II airport, the Cessna Citation II (Citation Bravo) with an approach speed of 112 knots and a wingspan of 51.8 feet is selected as the critical aircraft, or most demanding aircraft, using the facility. The *March 1996 Concord Municipal Airport Master Plan Update* identified the Gulfstream I as the design aircraft; however, this aircraft is older and is no longer used as often. Discussions with Concord Aviation Services indicate that the Cessna Citation is the most common jet aircraft using the facility.

5.0 Fuel Flowage

Fuel sales are an indication of growth at the airport, and can identify the rates of growth occurring in the turbine aircraft sector (indicated by jet fuel sales) and single and multi-engine piston sector (indicated by 100 LL Avgas sales).

The existing fuel storage capacity and the need for additional fuel storage for Concord Municipal Airport are identified in *Chapter 1 – Inventory.*

Fuel sales forecasts are developed in this section to quantify the additional capacity already indicated as necessary by on-airport personnel and to estimate the airport revenues that may be received from fuel flowage fees. Projections are developed using the average fuel growth rates from the *FAA Aerospace Forecasts, Fiscal Years 2004-2015* growth rates.[xxvi] Fuel sales projections are detailed in **Table 2-15**.

Table 2-15: Fuel Sales Projections (Rounded to the Nearest 100)

Year	Jet A Yearly Total (In gallons)	100 LL Avgas Yearly Total (In gallons)
2003*	222,687	59,200
2008	265,200	74,400
2013	318,100	78,300
2023	457,400	86,700

* Base on a "snapshot" of the airports actual sales as of December 2003 (not rounded)

6.0 Forecast Summary

Table 2-16 displays the forecast summary for the major forecast elements previously discussed in this chapter.

Table 2-16: Concord Municipal Airport Forecast Summary

Activity	2008	2013	2023
Based Aircraft:			
Single Engine (SE)	71	80	99
Multi-Engine (ME)	7	8	9
Turboprop (TP)	4	4	6
Turbo Jet (TJ)	1	2	3
Helicopter (HE)	2	2	3
Other: Ultralight (UL)	5	6	7
Other: Glider (GL)	0	0	0
Other: equipment type not specified	0	0	0
Experimental (EXP)	0	0	0
Military	10	10	10
Total Based Aircraft	**100**	**112**	**137**
Annual Operations:			
Total Annual Operations	**62,300**	**69,800**	**85,400**
Peak Hour Operations	**42**	**46**	**56**
Local/Itinerant Operations:			
Annual Local	24,900	27,900	34,200
Peak Hour Local	17	18	22
Itinerant	37,400	41,900	51,200
Peak Hour Itinerant	25	28	34
Touch-and-Go Operations:	7,500	8,400	10,300
Night/Day Operations:			
Annual Nighttime	12,500	14,000	17,100
Peak Hour Nighttime	8	9	10
Annual Daytime	49,900	55,900	68,300
Peak Hour Daytime	33	37	46
VFR Operations:			
Annual VFR Operations	37,400	41,900	51,200
Peak Hour VFR Operations	25	27	33
IFR Operations:			
Annual IFR Operations	24,900	27,900	34,200
Peak Hour IFR Operations	17	19	23
Critical Aircraft:			
Overall ARC	B-II		
Critical Aircraft Type	Cessna Citation II (Citation Bravo)		
Critical Aircraft Wingspan	51.6 feet		
Critical Aircraft Approach Speed	112 knots		
Fuel Sales:			
Jet A (gallons)	265,200	318,100	457,400
100 LL Avgas (gallons)	74,400	78,300	86,700

Endnotes

[i] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996.

[ii] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003.

[iii] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, pp. 5-27 to 5-30.

[iv] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, p. 5-29.

[v] David Rolla dmr@confbo.com, "Master Plan info," September 3, 2004, office email communication (September 3, 2004).

[vi] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, pp. 2-8 – 2-9.

[vii] U.S. Department of Transportation, Federal Aviation Administration, *FAA Aerospace Forecast – Fiscal Years 2004 – 2015*, U.S. Government Printing Office, Washington, DC, March 2004, Table 31.

[viii] U.S. Department of Transportation, Federal Aviation Administration, *FAA Aerospace Forecast – Fiscal Years 2004 – 2015*, U.S. Government Printing Office, Washington, DC, March 2004.

[ix] U.S. Department of Transportation, Federal Aviation Administration, *FAA Aerospace Forecast – Fiscal Years 2003 – 2015*, U.S. Government Printing Office, Washington, DC, March 2004. pp. V-14 to V-17.

[x] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, p. 5-30.

[xi] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, p. 2-10.

[xii] Armstrong, Bruce (Owner, Sunlight Corporation). Personal Interview. September 1, 2004.

[xiii] Col. Burritt, Stephen C. (Engineer - New Hampshire Army National Guard). Personal Interview. August 5, 2004.

[xiv] Lombardi, Tom (Sergeant with the New Hampshire State Police – Aviation Unit). Personal Interview. August 13, 2004.

[xv] Lt. Col. Ninness, Darin (Commander – Civil Air Patrol). Personal Interview. September 1, 2004.

[xvi] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996, p. 2-12.

[xvii] David Rolla dmr@confbo.com, "RE: Touch and Goes," September 30, 2004, office email communication (September 30, 2004).

[xviii] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 7*, U.S. Government Printing Office, Washington, DC, October 2002, p.1.

[xix] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996, p. 2-13.

[xx] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, p. 2-7.

[xxi] David Rolla dmr@confbo.com, "Master Plan info," September 3, 2004, office email communication (September 3, 2004).

According to David, the most common aircraft using the airfield are as follows: Beechcraft BeechJet 400, Beechcraft King Air, Cessna Citation, Cessna 172, and Piper Warrior.

[xxii] Stanley W. Kandebo with a team of Aviation Week & Space Technology editors, " Outlook/Specifications – Business & General Aviation Aircraft", *Aviation Week & Space Technology*, Aerospace Source Book 2000, January 13, 2003.

[xxiii] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 7*, U.S. Government Printing Office, Washington, DC, October 2002.

[xxiv] Burns & McDonnell, *Aircraft Characteristics, 7th Edition*, Burns & McDonnell, Kanas City, MI, ND.

[xxv] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 7*, U.S. Government Printing Office, Washington, DC, October 2002, pp. 14,15, 16, 22, 24, 25, 26, and 36.

[xxvi] U.S. Department of Transportation, Federal Aviation Administration, *FAA Aerospace Forecast – Fiscal Years 2004 – 2015*, U.S. Government Printing Office, Washington, DC, March 2004, Table 25.